

**CONSTRUCTION PERMIT
OFFICE OF AIR MANAGEMENT**

**Praxair, Inc.
Foot of Standard Avenue
Whiting, Indiana 46394**

is hereby authorized to construct and operate a modification to the industrial gas manufacturing plant, consisting of the equipment listed in the Page 2 of this permit.

This permit supercedes the permit CP-089-8510-00435, previously issued on October 8, 1997.

This permit is issued to the above mentioned company (herein known as the Permittee) under the provisions of 326 IAC 2-1 and 40 CFR 52.780, with conditions listed on the attached pages.

Construction Permit No.: CP-089-10413-00435	
Issued by: Paul Dubenetzky, Branch Chief Office of Air Management	Issuance Date:

- (a) one (1) natural gas fired boiler, identified as Boiler No. 3, rated at 38.8 million British thermal units (MMBtu) per hour, exhausting at one (1) stack, identified as S/V 007;
- (b) one (1) steam methane reformer, identified as Reformer No. 2, equipped with low NOx burners, using a mixture of process tail gas and natural gas as fuel, rated at 37.1 million British thermal units per hour, and exhausting at one (1) stack, identified as S/V 008. During Reformer No. 2 startup, carbon monoxide (CO) containing process gas will exhaust through one (1) process vent stack, identified as S/V 010;
- (c) One (1) steam methane reformer, identified as Reformer No. 3, equipped with a low NOx burner and a selective catalytic reduction (SCR) for NOx pollution control, using a mixture of process tail gas and natural gas as fuel, rated at 83.8 million British thermal units (MMBtu) per hour, and exhausting through stack S/V 011. During Reformer #3 startup, carbon monoxide (CO) containing process gas will exhaust through stack S/V 012;
- (d) One (1) 100 kilowatt emergency generator, identified as A13, driven by a 154.0 horsepower diesel engine, combusting No. 2 diesel fuel oil, exhausting through stack S/V 013;
- (e) One (1) 350 kilowatt emergency generator, identified as A15, driven by a 519.0 horsepower diesel engine, combusting No. 2 diesel fuel oil, exhausting through stack S/V 015; and
- (f) One (1) carbon dioxide (CO₂) purification system for recovering and purifying CO₂ generated by the three (3) reformers at the source, capable of processing 154,000 cubic feet per hour (SCFH) of feed gas. The by-product stream from the system will continuously exhausts through one (1) stack, identified as S/V 014, with a maximum design flow rate of 5,065 standard cubic feet per hour (SCFH) and containing no more than 1.52% by volume of carbon monoxide (CO). When carbon dioxide purification system is not operating, the feed gas generated from the three (3) reformers will exhaust through one (1) stack, identified as S/V 009, with a maximum design flow rate of 154,000 standard cubic feet per hour (SCFH) and containing no more than 0.052% by volume of carbon monoxide (CO).

Construction Conditions

General Construction Conditions

1. That the data and information supplied with the application shall be considered part of this permit. Prior to any proposed change in construction which may affect allowable emissions, the change must be approved by the Office of Air Management (OAM).
2. That this permit to construct does not relieve the permittee of the responsibility to comply with the provisions of the Indiana Environmental Management Law (IC 13-11 through 13-20; 13-22 through 13-25; and 13-30), the Air Pollution Control Law (IC 13-17) and the rules promulgated thereunder, as well as other applicable local, state, and federal requirements.

Effective Date of the Permit

3. That pursuant to IC 13-15-5-3, this permit becomes effective upon its issuance.
4. That pursuant to 326 IAC 2-1-9(b)(Revocation of Permits), the Commissioner may revoke this permit if construction is not commenced within eighteen (18) months after receipt of this approval or if construction is suspended for a continuous period of one (1) year or more.
5. That notwithstanding Construction Condition No. 6, all requirements and conditions of this construction permit shall remain in effect unless modified in a manner consistent with procedures established for modifications of construction permits pursuant to 326 IAC 2 (Permit Review Rules).

First Time Operation Permit

6. That this document shall also become a first-time operation permit pursuant to 326 IAC 2-1-4 (Operating Permits) when, prior to start of operation, the following requirements are met:
 - (a) The attached affidavit of construction shall be submitted to the Office of Air Management (OAM), Permit Administration & Development Section, verifying that the facilities were constructed as proposed in the application. The facilities covered in the Construction Permit may begin operating on the date the Affidavit of Construction is postmarked or hand delivered to IDEM.
 - (b) If construction is completed in phases; i.e., the entire construction is not done continuously, a separate affidavit must be submitted for each phase of construction. Any permit conditions associated with operation start up dates such as stack testing for New Source Performance Standards (NSPS) shall be applicable to each individual phase.
 - (c) Permittee shall receive an Operation Permit Validation Letter from the Chief of the Permit Administration & Development Section and attach it to this document.
 - (d) The operation permit will be subject to annual operating permit fees pursuant to 326 IAC 2-7-19 (Fees).

- (e) Pursuant to 326 IAC 2-7-4, the Permittee shall apply for a Title V operating permit within twelve (12) months after the source completes construction of the facilities in CP-089-8510-00435, issued on October 8, 1997. This 12-month period starts at the postmarked submission date of the Affidavit of Construction. The current carbon monoxide emissions in Condition C.1 of their FESOP Permit No. F089-5553-00435, issued on June 13, 1997, shall remain at 99 tons per year until the Title V permit has been issued.

NSPS Reporting Requirement

- 7. That pursuant to the New Source Performance Standards (NSPS), 40 CFR Part 60.40c through 60.48c, Subpart Dc, the source owner/operator is hereby advised of the requirement to report the following at the appropriate times:
 - (a) Commencement of construction date (no later than 30 days after such date);
 - (b) Anticipated start-up date (not more than 60 days or less than 30 days prior to such date);
and
 - (c) Actual start-up date (within 15 days after such date).

Reports are to be sent to:

Indiana Department of Environmental Management
Compliance Data Section, Office of Air Management
100 North Senate Avenue, P. O. Box 6015
Indianapolis, IN 46206-6015

and

IDEM Northwest Indiana Office
Gainer Bank Building
Suite 418
504 North Broadway
Gary, Indiana 46402

The application and enforcement of these standards have been delegated to the IDEM-OAM. The requirements of 40 CFR Part 60 are also federally enforceable.

- 8. That when the facility is constructed and placed into operation the following operation conditions shall be met:

Operation Conditions

General Operation Conditions

1. That the data and information supplied in the application shall be considered part of this permit. Prior to any change in the operation which may result in an increase in allowable emissions exceeding those specified in 326 IAC 2-1-1 (Construction and Operating Permit Requirements), the change must be approved by the Office of Air Management (OAM).
2. That the permittee shall comply with the provisions of the Indiana Environmental Management Law (IC 13-11 through 13-20; 13-22 through 13-25; and 13-30), the Air Pollution Control Law (IC 13-17) and the rules promulgated thereunder.

Preventive Maintenance Plan

3. That pursuant to 326 IAC 1-6-3 (Preventive Maintenance Plans), the Permittee shall prepare and maintain a preventive maintenance plan, including the following information:
 - (a) Identification of the individual(s) responsible for inspecting, maintaining, and repairing emission control devices.
 - (b) A description of the items or conditions that will be inspected and the inspection schedule for said items or conditions.
 - (c) Identification of the replacement parts which will be maintained in inventory for quick replacement.

The preventive maintenance plan shall be submitted to IDEM, OAM upon request and shall be subject to review and approval.

Transfer of Permit

4. That pursuant to 326 IAC 2-1-6 (Transfer of Permits):
 - (a) In the event that ownership of this industrial gas manufacturing plant is changed, the Permittee shall notify OAM, Permit Branch, within thirty (30) days of the change. Notification shall include the date or proposed date of said change.
 - (b) The written notification shall be sufficient to transfer the permit from the current owner to the new owner.
 - (c) The OAM shall reserve the right to issue a new permit.

Permit Revocation

5. That pursuant to 326 IAC 2-1-9(a)(Revocation of Permits), this permit to construct and operate may be revoked for any of the following causes:
 - (a) Violation of any conditions of this permit.
 - (b) Failure to disclose all the relevant facts, or misrepresentation in obtaining this permit.

- (c) Changes in regulatory requirements that mandate either a temporary or permanent reduction of discharge of contaminants. However, the amendment of appropriate sections of this permit shall not require revocation of this permit.
- (d) Noncompliance with orders issued pursuant to 326 IAC 1-5 (Episode Alert Levels) to reduce emissions during an air pollution episode.
- (e) For any cause which establishes in the judgment of IDEM, the fact that continuance of this permit is not consistent with purposes of 326 IAC 2-1 (Permit Review Rules).

Availability of Permit

6. That pursuant to 326 IAC 2-1-3(l), the Permittee shall maintain the applicable permit on the premises of this source and shall make this permit available for inspection by the IDEM, IDEM Northwest Indiana Office or other public official having jurisdiction.

Performance Testing

7. (a) That pursuant to 326 IAC 2-1-3 (Construction and Operating Permit Requirements) compliance stack tests shall be performed for:
- (1) NO_x for Boiler No. 3, Reformer No.1, Reformer No. 2 and Reformer No. 3;
 - (2) CO (new line) (i) upstream of the PSA unit of Plant No. 2 and 3 and (new line) (ii) in the feed stream to the carbon dioxide liquefier, which is the same stream as that venting through S/V 009 when the carbon dioxide liquefier is not operating; and
 - (3) Ratios of tail-gas and natural gas fuel usage to feedstock flow for each of Reformers No. 1, No. 2 and No. 3;
- within 60 days after achieving maximum production rate, but no later than 180 days after initial start-up. These tests shall be performed according to 326 IAC 3-2.1 (Source Sampling Procedures) using the methods specified in the rule or as approved by the Commissioner.
- (b) A test protocol shall be submitted to the OAM, Compliance Data Section, 35 days in advance of the test.
 - (c) The Compliance Data Section shall be notified of the actual test date at least two (2) weeks prior to the date.
 - (d) All test reports must be received by the Compliance Data Section within 45 days of completion of the testing.
 - (e) Whenever the results of the stack test performed exceed the level specified in this permit, appropriate corrective actions shall be implemented within thirty (30) days of receipt of the test results. These actions shall be implemented immediately unless notified by OAM that they are acceptable. The Permittee shall minimize emissions while the corrective actions are being implemented.

- (f) Whenever the results of the stack test performed exceed the level specified in this permit, a second test to demonstrate compliance shall be performed within 120 days. Failure of the second test to demonstrate compliance may be grounds for immediate revocation of this permit to operate the affected facility.

PSD Minor Source Limit

8. (a) That carbon monoxide (CO) production rate from process vent stacks of Reformers #1, 2, and 3 (S/V 006, 010, and 012) shall be limited to 134.9 million standard cubic feet per year (MMscf/yr), based on a 12 month rolling total. This is equivalent to the carbon monoxide emissions from the process vent stacks of Reformers #1, 2, and 3 (S/V 006, 010, and 012) to 201.9 tons per year. Instrumentation that continuously computes the vented CO, as a function of the duration and amount of vent valve opening, shall be permanently installed on Reformers #1, 2, and 3 and shall be tested.
- (b) That carbon monoxide (CO) production rate from the existing facility shall be limited to the following:
- (1) Boiler #3 shall be limited to an annual fuel limitation of 237.9 million cubic feet per year (MMcf/yr), based on a 12 month rolling total. This is equivalent to the carbon monoxide emissions from Boiler #3 to 3.30 tons per year;
 - (2) Reformer #1 shall be limited to 353.9 million cubic feet per year (MMcf/yr), based on a 12 month rolling total. This is equivalent to the carbon monoxide emissions from Reformer #1 to 2.48 tons per year;
 - (3) Reformer #2 shall be limited to 325.0 million cubic feet per year (MMcf/yr), based on a 12 month rolling total. This is equivalent to the carbon monoxide emissions from Reformer #1 to 2.27 tons per year;
 - (4) Reformer #3 shall be limited to 734.1 million cubic feet per year (MMcf/yr), based on a 12 month rolling total. This is equivalent to the carbon monoxide emissions from Reformer #1 to 5.14 tons per year; and
 - (5) Vent stack from CO₂ Plant shall be limited to 210 tons of carbon dioxide per year, based on a 12 month rolling total. This is equivalent to the carbon monoxide emissions from vent stack from CO₂ Plant to 32.21 tons per year.

The source-wide potential to emit of CO after this modification, including the potential to emit of CO for the existing facility of 1.62 tons per year, shall be limited to 248 tons per year. Therefore, the Prevention of Significant Deterioration (PSD) rules, 326 IAC 2-2 and 40 CFR 52.21, will not apply.

Emission Offset Minor Source Limit

9. (a) That the fuel usage from Reformers #1, 2, 3, and Boiler #3 shall be limited to 1,972 pounds per 12-month period, rolled on a monthly basis, as follows:

$$AA + 0.168 BB + 0.772 NN \leq 1,972$$

where: AA = Reformers #1 and #2 annual fuel consumption in MMCF/yr
BB = Reformer #3 annual fuel consumption in MMCF/yr
NN = Boiler #3 annual fuel consumption in MMCF/yr

- (b) To determine the natural gas plus tail gas fuel usage (RD, in million feet per year based on a 12 month rolling total, for Reformers #1, 2, and 3, the following formula shall be used:

$$Rd = 1.073 * Fd1 + 1.147 * Fd2 + 1.273 * Fd3$$

where: Fd1 is the feedstock flow (in million cubic feet per 12 month rolling total) to Reformer No. 1;
Fd2 is the feedstock flow (in million cubic feet per 12 month rolling total) to Reformer No. 2; and
Fd3 is the feedstock flow (in million cubic feet per 12 month rolling total) to Reformer No. 3

The three (3) constants in the formula (1.073, 1.147, and 1.273) shall be adjusted based on the performance test results, as required in Operation Condition No. 7.

- (c) The two (2) emergency generators will limit NO_x emissions to 1.0 ton per year by limiting the operating hours of the 100 kW and 350 kW emergency generators to 100 hours per 12 consecutive month period.
- (d) These fuel usage limitations is equivalent to a NO_x emissions increase of less than 25 tons per year due to the proposed modification. Therefore, the Emission Offset rules, 326 IAC 2-3, will not apply.

Annual Emission Reporting

10. That pursuant to 326 IAC 2-6 (Emission Reporting), the Permittee must annually submit an emission statement for the source. This statement must be received by April 15 of each year and must comply with the minimum requirements specified in 326 IAC 2-6-4. The annual statement must be submitted to:

Indiana Department of Environmental Management
Technical Support and Modeling Section, Office of Air Management
100 North Senate Avenue, P. O. Box 6015
Indianapolis, Indiana 46206-6015

The annual emission statement covers the twelve (12) consecutive month time period starting December 1 and ending November 30.

Opacity Limitations

11. That pursuant to 326 IAC 5-1-2 (Opacity Limitations), except as provided in 326 IAC 5-1-3 (Temporary Exemptions), opacity shall meet the following, unless otherwise stated in this permit:
- (a) Opacity shall not exceed an average of twenty percent (20%) any one (1) six (6) minute averaging period as determined in 326 IAC 5-1-4.
- (b) Opacity shall not exceed sixty percent (60%) for more than a cumulative total of fifteen (15) minutes (sixty (60) readings) as measured according to 40 CFR 60, Appendix A, Method 9 or fifteen (15) one (1) minute nonoverlapping integrated averages for a continuous opacity monitor) in a six (6) hour period.

Particulate Matter Limitation

12. That pursuant to 326 IAC 6-2-4(a) (Particulate Emission Limitations for Sources of Indirect Heating), particulate matter (PM) emissions from the 38.8 million British thermal units per hour boiler shall be limited to 0.395 pound per million British thermal units heat input.

Record Keeping Requirements

13. That pursuant to 326 IAC 12 and 40 CFR Part 60.48c, records of fuel combusted for the 38.8 million British thermal units per hour natural gas fired boiler shall be maintained. These records shall be kept for at least the past 24 month period and made available upon request to the Office of Air Management (OAM).

Reporting Requirements

14. That a log of information necessary to document compliance with operation permit condition nos. 8 and 9 shall be maintained. These records shall be kept for at least the past 36 month period and made available upon request to the Office of Air Management (OAM).

- (a) A quarterly summary shall be submitted to:

Indiana Department of Environmental Management
Compliance Data Section, Office of Air Management
100 North Senate Avenue, P.O. Box 6015
Indianapolis, Indiana 46206-6015

within thirty (30) calendar days after the end of the quarter being reported in the format attached. These reports shall include monthly fuel usage for Reformers #1, 2, 3, and Boiler #3, CO emissions for process vent stacks for Plant Nos. 1, 2, and 3, and operating hours for two (2) emergency generators.

- (b) Unless otherwise specified in this permit, any notice, report, or other submissions required by this permit shall be timely if:

(i) Postmarked on or before the date it is due; or

(ii) Delivered by any other method if it is received and stamped by IDEM, OAM, IDEM Northwest Indiana Office, on or before the date it is due.

- (c) All instances of deviations from any requirements of this permit must be clearly identified in such reports.

- (d) Any corrective actions taken as a result of an exceedance of a limit, an excursion from the parametric values, or a malfunction that may have caused excess emissions must be clearly identified in such reports.

- (e) The first report shall cover the period commencing the postmarked submission date of the Affidavit of Construction.

Emergency Reduction Plans

15. Pursuant to 326 IAC 1-5-2 (Emergency Reduction Plans; Submission):

- (a) The Permittee shall prepare written emergency reduction plans (ERPs) consistent with safe operating procedures.

- (b) These ERPs shall be submitted for approval to:

Indiana Department of Environmental Management
Compliance Branch, Office of Air Management
100 North Senate Avenue, P.O. Box 6015
Indianapolis, Indiana 46206-6015

within 180 calendar days from the issuance date of this permit.

- (c) If the ERP is disapproved by IDEM, OAM, the Permittee shall have an additional thirty (30) days to resolve the differences and submit an approvable ERP.
- (d) These ERPs shall state those actions that will be taken, when each episode level is declared, to reduce or eliminate emissions of the appropriate air pollutants.
- (e) Said ERPs shall also identify the sources of air pollutants, the approximate amount of reduction of the pollutants, and a brief description of the manner in which the reduction will be achieved.
- (g) Upon direct notification by IDEM, OAM that a specific air pollution episode level is in effect, the Permittee shall immediately put into effect the actions stipulated in the approved ERP for the appropriate level [326 IAC 1-5-3].

Natural Gas Fired Boiler Certification

16. That a certification of natural gas usage for Boiler #3 shall be submitted quarterly, to comply with operation permit condition no. 12, to:

Indiana Department of Environmental Management
Compliance Data Section, Office of Air Management
100 North Senate Avenue, P.O. Box 6015
Indianapolis, Indiana 46206-6015

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR MANAGEMENT
COMPLIANCE DATA SECTION
Quarterly Report**

Source Name: Praxair, Inc.
Source Address: Foot of Standard Avenue, Whiting, Indiana 46394
Permit No.: CP 089-10413-00435
Facility: Boiler #3, Reformer #1, Reformer #2, and Reformer #3
Parameter: Nitrogen Oxides (NOx)
Limit: Annual fuel usage for Boiler #3, Reformer #1, Reformer #2, and Reformer #3 based on the following formula:

$AA + 0.168 BB + 0.772 NN \# 1,972$

- where:
- (1) AA is the annual fuel consumption (tail gas plus natural gas) per year for Reformers #1 and #2 in million cubic feet (MMCF) based on a 12 month rolling total;
 - (2) BB is the annual fuel consumption (tail gas plus natural gas) per year for Reformer #3 in million cubic feet (MMCF) based on a 12 month rolling total; and
 - (3) NN is the annual natural gas fuel consumption per year for Boiler #3, based on a 12 month rolling total.

Month: _____ **Year:** _____

Month	Total Fuel Usage (MMCF) This Month				Total Fuel Usage Previous 11 Months (MMCF)	Total 12 Month Fuel Usage (MMCF)
	AA	BB	NN	AA+BB+NN		
Month 1						
Month 2						
Month 3						

9 No deviation occurred in this month.

9 Deviation(s) occurred in this month.

Deviation has been reported on: _____

Submitted by: _____

Title/Position: _____

Signature: _____

Date: _____

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR MANAGEMENT
COMPLIANCE DATA SECTION**

Quarterly Report

Source Name: Praxair, Inc.
Source Address: Foot of Standard Avenue, Whiting, Indiana 46394
Permit No.: CP 089-10413-00435
Facility: Plant #1, 2, 3 process vent stacks
Parameter: Carbon Monoxide (CO)
Limit: CO from all three stacks, not to exceed 201.9 tons per year, based on 12 month rolling total.

Month: _____ **Year:** _____

Month	Total CO Emissions (tons) This Month				Total CO Emissions Previous 11 Months (tons)	Total 12 Month CO Emissions (tons)
	Plant #1 Process Vent	Plant #2 Process Vent	Plant #3 Process Vent	Plant #1 + Plant #2 + Plant #3		
Month 1						
Month 2						
Month 3						

9 No deviation occurred in this month.

9 Deviation(s) occurred in this month.

Deviation has been reported on: _____

Submitted by: _____

Title/Position: _____

Signature: _____

Date: _____

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR MANAGEMENT
COMPLIANCE DATA SECTION**

Quarterly Report

Source Name: Praxair, Inc.
Source Address: Foot of Standard Avenue, Whiting, Indiana 46394
Permit No.: CP 089-10413-00435
Facility: Emergency Generator (A13)
Parameter: Operating hours
Limit: Operating hours do not exceed 100 hours per twelve (12) consecutive month period.

Month: _____ Year: _____

Month	Operating Hours This Month	Operating Hours Previous 11 Months	Operating Hours 12 Month Total

9 No deviation occurred in this month.

9 Deviation(s) occurred in this month.

Deviation has been reported on: _____

Submitted by: _____

Title/Position: _____

Signature: _____

Date: _____

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR MANAGEMENT
COMPLIANCE DATA SECTION**

Quarterly Report

Source Name: Praxair, Inc.
Source Address: Foot of Standard Avenue, Whiting, Indiana 46394
Permit No.: CP 089-10413-00435
Facility: Emergency Generator (A15)
Parameter: Operating hours
Limit: Operating hours do not exceed 100 hours per twelve (12) consecutive month period

Month: _____ **Year:** _____

Month	Operating Hours This Month	Operating Hours Previous 11 Months	Operating Hours 12 Month Total

9 No deviation occurred in this month.

9 Deviation(s) occurred in this month.

Deviation has been reported on: _____

Submitted by: _____

Title/Position: _____

Signature: _____

Date: _____

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR MANAGEMENT
COMPLIANCE DATA SECTION**

**PART 70 OPERATING PERMIT
NATURAL GAS FIRED BOILER CERTIFICATION**

Source Name: Praxair, Inc.
Source Address: Foot of Standard Avenue, Whiting, Indiana 46394
Mailing Address: Foot of Standard Avenue, Whiting, Indiana 46394
Permit No.: CP 089-10413-00435

**This certification shall be included when submitting monitoring, testing reports/results
or other documents as required by this permit.**

Report period

Beginning: _____

Ending: _____

Boiler Affected

Alternate Fuel

Days burning alternate fuel

From

To

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

Signature: _____

Printed Name: _____

Title/Position: _____

Date: _____

**Indiana Department of Environmental Management
Office of Air Management
and
IDEM Northwest Indiana Office**

Technical Support Document (TSD) for New Construction and Operation

Source Background and Description

Source Name:	Praxair, Inc.
Source Location:	Foot of Standard Avenue, Whiting, IN 46394
County:	Lake
Construction Permit No.:	CP-089-10413-00435
SIC Code:	2813
Permit Reviewer:	Yvette de los Angeles/EVP

The Office of Air Management (OAM) has reviewed an application from Praxair, Inc. relating to the construction and operation of a modification to the industrial gas manufacturing plant, consisting of the following equipment:

- (a) one (1) natural gas fired boiler, identified as Boiler No. 3, rated at 38.8 million British thermal units (MMBtu) per hour, exhausting at one (1) stack, identified as S/V 007;
- (b) one (1) steam methane reformer, identified as Reformer No. 2, equipped with low NO_x burners, using a mixture of process tail gas and natural gas as fuel, rated at 37.1 million British thermal units per hour, and exhausting at one (1) stack, identified as S/V 008. During Reformer No. 2 startup, carbon monoxide (CO) containing process gas will exhaust through one (1) process vent stack, identified as S/V 010;
- (c) One (1) steam methane reformer, identified as Reformer No. 3, equipped with a low NO_x burner and a selective catalytic reduction (SCR) for NO_x pollution control, using a mixture of process tail gas and natural gas as fuel, rated at 83.8 million British thermal units (MMBtu) per hour, and exhausting through stack S/V 011. During Reformer #3 startup, carbon monoxide (CO) containing process gas will exhaust through stack S/V 012;
- (d) One (1) 100 kilowatt emergency generator, identified as A13, driven by a 154.0 horsepower diesel engine, combusting No. 2 diesel fuel oil, exhausting through stack S/V 013;
- (e) One (1) 350 kilowatt emergency generator, identified as A15, driven by a 519.0 horsepower diesel engine, combusting No. 2 diesel fuel oil, exhausting through stack S/V 015; and
- (f) One (1) carbon dioxide (CO₂) purification system for recovering and purifying CO₂ generated by the three (3) reformers at the source, capable of processing 154,000 cubic feet per hour (SCFH) of feed gas. The by-product stream from the system will continuously exhausts through one (1) stack, identified as S/V 014, with a maximum design flow rate of 5,065 standard cubic feet per hour (SCFH) and containing no more than 1.52% by volume of carbon monoxide (CO).

When carbon dioxide purification system is not operating, the feed gas generated from the three (3) reformers will exhaust through one (1) stack, identified as S/V 009, with a maximum design flow rate of 154,000 standard cubic feet per hour (SCFH) and containing no more than 0.052% by volume of carbon monoxide (CO).

History

On June 13, 1997, Praxair, Inc. was issued a FESOP No. F089-5553-00435 for its industrial gas manufacturing plant. Then, on October 8, 1997, Praxair, Inc. was issued a Construction Permit No. CP 089-8510-00435. On November 24, 1998, Praxair, Inc. submitted an application to amend CP 089-8510-00435 to add hydrogen plant No. 3 at this facility. The source will retain the same limits on carbon monoxide (CO) and nitrogen oxides (NOx) to avoid PSD and Emission Offset rules. Therefore, the attached Construction Permit No. 089-10413-00435 shall supersede Construction Permit No. 089-8510-00435, issued on October 8, 1997.

Stack Summary

Stack ID	Operation	Height (feet)	Diameter (feet)	Flow Rate (acfm)	Temperature (°F)
003	Reformer No. 1	50	3.0	17,000	390
006	By-product Vent	101	0.33	54	100
007	Boiler No. 3	30	2.0	10,353	381
008	Reformer No. 2	50	2.44	9,966	307
009	CO ₂ Feed Vent	30	0.67	2,600	100
010	Process Vent	101	0.33	18,000	700
011	Reformer No. 3	66	3.0	22,410	358
012	Process Vent	105	0.33	29,330	843
013	Emergency Generator	10	0.5	794	1,076
014	Waste Gas Vent	30	0.17	90	100
015	Emergency Generator	10	0.7	2,691	1,025

Recommendation

The staff recommends to the Commissioner that the construction and operation be approved. This recommendation is based on the following facts and conditions:

Information, unless otherwise stated, used in this review was derived from the application and additional information submitted by the applicant.

A complete application for the purposes of this review was received on November 24, 1998.

An application for the purposes of this review was received on November 24, 1998, with additional information received on February 24, 1999.

Emissions Calculations

See Appendix A (Emissions Calculation Spreadsheets) for detailed calculations (nine (9) pages).

Total Potential and Allowable Emissions

Indiana Permit Allowable Emissions Definition (after compliance with applicable rules, based on 8,760 hours of operation per year at rated capacity):

Pollutant	*Allowable Emissions (tons/year)	Potential Emissions (tons/year)
Particulate Matter (PM)	20.1	14.6
Particulate Matter (PM10)	20.1	14.6
Sulfur Dioxide (SO ₂)	---	6.6
Volatile Organic Compounds (VOC)	---	12.2
Carbon Monoxide (CO)	249	28,558.1
Nitrogen Oxides (NO _x)	24	148.3
Single Hazardous Air Pollutant (HAP)	---	0.3
Combination of HAPs	---	0.3

* Allowable Emissions are based on CP-089-8510-000435, issued on October 8, 1997.

- (a) Allowable emissions are determined from the applicability of rule 326 IAC 2-2 (PSD) and 326 IAC 2-3 (Emission Offset). See attached spreadsheets for detailed calculations.
- (b) The allowable emissions based on the rules cited are less than the potential emissions, therefore, the allowable emissions are used for the permitting determination.
- (c) Allowable emissions (as defined in the Indiana Rule) of CO are greater than 25 tons per year. Therefore, pursuant to 326 IAC 2-1, Sections 1 and 3, a construction permit is required.

County Attainment Status

- (a) Volatile organic compounds (VOC) and oxides of nitrogen (NO_x) are precursors for the formation of ozone. Therefore, VOC and NO_x emissions are considered when evaluating the rule applicability relating to the ozone standards. Lake County has been designated as severe nonattainment for ozone. Therefore, VOC and NO_x emissions were reviewed pursuant to the requirements for Emission Offset, 326 IAC 2-3.
- (b) Lake County has been classified as nonattainment for PM-10 and SO₂. Therefore, these emissions were reviewed pursuant to the requirements for Emission Offset, 326 IAC 2-3.
- (c) Lake County has been classified as attainment for CO. Therefore, CO emissions were reviewed pursuant to the requirements for Prevention of Significant Deterioration (PSD), 326 IAC 2-2 and 40 CFR 52.21.

Source Status

Existing Source PSD, FESOP Definition (emissions after controls, based on 8,760 hours of operation per year at rated capacity and/ or as otherwise limited):

Pollutant	Emissions (ton/yr)
PM	3.4
PM10	3.4
SO ₂	0.3
VOC	1.0
CO	99.0
NO _x	18.3

- (a) This existing source is **not** a major stationary source because no attainment regulated pollutant is emitted at a rate of 250 tons per year or more, no nonattainment regulated pollutant is emitted at a rate of 100 tons per year, VOC and NOX are emitted at a rate of less than 25 tons per year, and it is not in one of the 28 listed source categories.
- (b) These emissions were based on the FESOP (F089-5553-00435) issued to the source on June 13, 1997.

Proposed Modification

PTE from the proposed modification (based on 8,760 hours of operation per year at rated capacity including enforceable emission control and production limit, where applicable):

Pollutant	PM (ton/yr)	PM10 (ton/yr)	SO ₂ (ton/yr)	VOC (ton/yr)	CO (1) (ton/yr)	NO _x (2) (3) (ton/yr)
Proposed Modification	7.83	7.83	0.57	5.03	201.90	24.99
PSD or Offset Threshold Level	100	100	100	25	250	25

- Note: (1) Praxair proposes to accept a limit of 201.90 tons per year on the combined CO emissions from the A6 (Plant 1 startup vent), A10 (Plant 2 startup vent) and A12 (Plant 3 startup vent).
- (2) Total NO_x emissions from Boiler No. 3, Reformer No. 1, Reformer No. 2, and Reformer No. 3 after modification are limited at 31.95 tons per year. The total NO_x emissions from the two (2) emergency generators after the modification are limited to 1.0 ton per year by limiting the fuel usage to 7 gal/hr for the 100 kW emergency generator and 26.6 gal/hr for the 350 kW emergency generator. Based on the information provided by the applicant, no NO_x generating facility was added to the source in the past five (5) years and average NO_x emissions for 1997-1998 are 7.96 tons per year.
- Therefore, the NO_x emission increase due to the modification = 32.95 ton/yr - 7.96 ton/yr = 24.99 ton/yr.
- (3) The NO_x emissions from Reformers #1, #2, #3 and Boiler #3 are based on the emission factors of 32.4, 32.4, 5.45 and 25.0 pounds of NO_x per MMCF of fuel consumed, respectively.

This modification to an existing minor stationary source is not major because the emission increase is less than the PSD and Emission Offset significant levels. Therefore, pursuant to 326 IAC 2-2, 40 CFR 52.21 and 326 IAC 2-3, the PSD requirements and Emission Offset requirements do not apply.

Part 70 Permit Determination

326 IAC 2-8 (FESOP) and 326 IAC 2-7 (Part 70 Permit Program)

This existing source has been issued a FESOP (F-089-5553-00435) on June 13, 1997. This source shall apply for a Title V operating permit to incorporate the existing facilities and the modification within twelve (12) months after the facilities begin construction for CP-089-8510-00435. The facilities began operating on June 30, 1998.

Federal Rule Applicability

326 IAC 12, 40 CFR Part 60.40c through 60.48c, Subpart Dc (Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units)

The 38.8 MMBtu/hr natural gas fired Boiler No. 3 is subject to the requirements of 40 CFR Part 60.40c, Subpart Dc. This rule applies to steam generating units constructed after June 9, 1989, which have a maximum design heat input capacity between 10 and 100 MMBtu/hr. Pursuant to this rule, the owner or operator shall submit notification of the date of construction, anticipated startup and actual startup, as well as record keeping and reporting as required by Subpart Dc, including quarterly reporting of fuel supplier certification information.

There are no National Emission Standard for Hazardous Air Pollutants (NESHAP), 40 CFR Part 63, applicable to this source.

State Rule Applicability

326 IAC 2-2 (Prevention of Significant Deterioration)

This proposed modification is not subject to the requirements of 326 IAC 2-2 (Prevention of Significant Deterioration). Carbon monoxide (CO) emissions from Plant Nos. 1, 2 and 3 process vent stacks shall be limited to a combined total of 201.90 tons per year. The source-wide potential to emit of CO after this modification, including the potential to emit of CO for the existing facility of 47 tons per year, shall be less than 250 tons per year. Therefore the source shall remain a minor PSD source and Prevention of Significant Deterioration (PSD) rules, 326 IAC 2-2 and 40 CFR 52.21, will not apply.

326 IAC 2-3 (Emission Offset)

This proposed modification is not subject to the requirements of 326 IAC 2-3 (Emission Offset). The total NOx emissions from existing Boiler No. 3, existing Reformers No. 1 and 2, and Reformer No. 3 after modification are limited to 31.95 tons per year by limiting annual fuel usages from Reformer #1, Reformer #2, Reformer #3 and Boiler #3 (see detailed calculations in Appendix A, page 1 of 9) based on the following formula:

$$AA + 0.168 BB + 0.772 NN \leq 1,972$$

where: AA = Reformers #1 and #2 annual fuel consumption in MMCF/yr

BB = Reformer #3 annual fuel consumption in MMCF/yr

NN = Boiler #3 annual fuel consumption in MMCF/yr

The two (2) emergency generators will limit NOx emissions to 1.0 ton per year by limiting the fuel usage of the 100 kW emergency generator to 7 gallons per hour and the 350 kW emergency generator to 26.6 gallons per hour.

These annual fuel usages are equivalent to limiting net NO_x emission increase due to the proposed modification to less than 25.0 tons per year (see explanation in page 4 of this TSD). Therefore, the Emission Offset rules, 326 IAC 2-3, will not apply.

326 IAC 2-6 (Emission Reporting)

This facility is subject to 326 IAC 2-6 (Emission Reporting), because the source emits more than 10 tons/yr of NO_x. Pursuant to this rule, the owner/operator of this facility must annually submit an emission statement of the facility. The annual statement must be received by April 15 of each year and must contain the minimum requirements as specified in 326 IAC 2-6-4.

326 IAC 5-1 (Opacity Limitations)

Pursuant to 326 IAC 5-1-2 (Opacity Limitations), except as provided in 326 IAC 5-1-3 (Temporary Exemptions), opacity shall meet the following, unless otherwise stated in this permit:

- (a) Opacity shall not exceed an average of twenty percent (20%) any one (1) six (6) minute averaging period as determined in 326 IAC 5-1-4.
- (b) Opacity shall not exceed sixty percent (60%) for more than a cumulative total of fifteen (15) minutes (sixty (60) readings) as measured according to 40 CFR 60, Appendix A, Method 9 or fifteen (15) one (1) minute nonoverlapping integrated averages for a continuous opacity monitor) in a six (6) hour period.

326 IAC 6-2 (Particulate Emissions Limitations for Sources of Indirect Heating)

The 38.8 MMBtu/hr natural gas fired boiler is subject 326 IAC 6-2 (Particulate Emissions Limitations for Sources of Indirect Heating). Pursuant to 326 IAC 6-2-4, the particulate matter (PM) emissions shall be limited to 0.395 pounds per MMBtu heat input (see calculation below).

Compliance Calculation:

Total heat input rating for existing boilers = 2 boilers * 5.3 MMBtu/hr = 10.6 MMBtu/hr

Pursuant to 326 IAC 6-2-4, allowable PM emission (in lb/MMBtu) for the new Boiler No. 3
= $1.09 / Q^{0.26}$ (Q is total source maximum operating capacity rating in MMBtu/hr)
= $1.09 / (38.8 + 10.6)^{0.26}$
= 0.395 lb/MMBtu

Potential PM Emissions for the new Boiler No. 3
= 1.29 tons per year (see page 2 of 9 of Appendix A)
= (1.29 tons PM/year) * (2,000 lbs/ton) * (1 year/8,760 hours) * (1 hour/38.8 MMBtu/hr)
= 0.008 lbs PM per MMBtu

Based on these calculations, the controlled potential emissions are less than the allowable emissions, therefore, this boiler complies with the rule.

326 IAC 8-1-6 (New facilities, General Reduction Requirements)

This modification is not subject to the provisions of 326 IAC 8-1-6. This rule requires all facilities constructed after January 1, 1980, which have potential VOC emission rates of 25 or more tons per year, and which have not otherwise regulated by other provisions of 326 IAC, to reduce VOC emissions using Best Available Control Technology (BACT). Since the equipment included in this modification are not subject to any other provisions of 326 IAC 8 and have potential VOC emissions of less than 25 tons per year, this modification is not subject to the requirements of 326 IAC 8-1-6 (New facilities, General Reduction Requirements).

326 IAC 9-1-2 (Carbon Monoxide Emission Limits)

The process vents are not subject to 326 IAC 9-1-2 (Carbon Monoxide Emission Limits). The process vents are not petroleum refining, ferrous metal smelters or refuse incinerator and burning equipment.

Air Toxic Emissions

Indiana presently requests applicants to provide information on emissions of the 188 hazardous air pollutants set out in the Clean Air Act Amendments of 1990. These pollutants are either carcinogenic or otherwise considered toxic and are commonly used by industries. They are listed as air toxics on the Office of Air Management (OAM) Construction Permit Application Form Y.

- (a) None of these listed air toxics will be emitted from this proposed construction.
- (b) See attached spreadsheets for detailed air toxic calculations.

Conclusion

The construction of this modification to the industrial gas manufacturing plant will be subject to the conditions of the attached proposed **Construction Permit No. CP-089-10413-00435**.

Appendix A: Emission Calculations CO Vent Emissions from CO2 Plant

Company Name: Praxair, Inc.
Address City IN Zip: Foot of Standard Avenue, Whiting, Indiana 46394
Operation Permit Number: 089-10413-00435
Reviewer: Yvette de los Angeles/EVP
Date: 06/21/99

Potential To Emit (tons/yr):

Process	Emission Rate (lbs/hr)	Uncontrolled Emissions (lbs/yr)	Uncontrolled Emissions (tons/yr)
CO2 Waste Gas	7.21	63,159.60	31.58
CO2 Feed	7.50	65,700.00	32.85
Maximum expected emissions:	7.36	64,429.80	32.21

Methodology

- (1) Potential Emissions (ton/yr) = Emission Rate (lbs/hr) * 8,760 hrs/yr * 1 ton/2,000 lbs
- (2) Emission rate provided by the applicant and shall be subject to stack testing after permit issuance.
 - (a) The tail gas generated by the PSA units in each of the three hydrogen plans contains a significant percentage of CO2. The CO2 is extracted from the tail gas and piped to the on-site CO2 plant, which purifies and liquifies the CO2 for sale.
 - (b) The CO2 feedstock to the CO2 plant contains about 520 ppm CO. This is removed during the CO2 purification process and vented continuously to the atmosphere through the CO2 vent (S/V 009). If the CO2 liquifier is down, all of the CO2 feedstock is vented temporarily through the same vent (S/V 009). Either way, the amount of CO vented remains the same.

Indiana Department of Environmental Management Office of Air Management

Addendum to the Technical Support Document for New Construction and Operation

Source Name: Praxair, Inc.
Source Location: Foot of Standard Avenue, Whiting, Indiana 46394
County: Lake
Construction Permit No.: CP-089-10413-00435
SIC Code: 2813
Permit Reviewer: Yvette de los Angeles/EVP

On April 30, 1999, the Office of Air Management (OAM) had a notice published in the Gary Post Tribune, Gary, Indiana, stating that Praxair, Inc. had applied for a construction permit to construct and operate a modification to the existing industrial gas manufacturing plant. The notice also stated that OAM proposed to issue a permit for this installation and provided information on how the public could review the proposed permit and other documentation. Finally, the notice informed interested parties that there was a period of thirty (30) days to provide comments on whether or not this permit should be issued as proposed.

Upon further review, the OAM has decided to make the following changes to the Construction Permit (changes in bold or strikeout for emphasis):

Comment 1

In Operation Condition 16, the natural gas usage certification to be submitted should show compliance with Operation Condition 12, not Operation Condition 11.

Response 1

Operation Condition 16 shall be modified as follows:

16. Natural Gas Fired Boiler Certification
That a certification of natural gas usage for Boiler #3 shall be submitted quarterly, to comply with operation permit condition no. ~~11~~ **12**, to:

Indiana Department of Environmental Management
Compliance Data Section, Office of Air Management
100 North Senate Avenue, P.O. Box 6015
Indianapolis, Indiana 46206-6015

Appendix A: Emission Calculations

Company Name: Praxair, Inc.
Address City IN Zip: Foot of Standard Avenue, Whiting, IN 46394
CP: 089-10413
Plt ID: 089-00435
Reviewer: Yvette de los Angeles/EVP
Date: 06/21/99

Uncontrolled Potential Emissions (tons/year)										
Emissions Generating Activity										
Pollutant	Boiler No. 3	Reformer No. 1 (taken from CP-089-8510-00435)	Process Vent Stack No. 1 (taken from CP-089-8510-00435)	Reformer No. 2 (taken from CP-089-8510-00435)	Process Vent Stack No. 2	Reformer No. 3	Process Vent Stack No. 3	Vent Stack from CO2 Plant	Two (2) Emergency Generators	TOTAL
PM	1.29	2.48	0.00	2.27	0.00	2.09	0.00	0.00	6.48	14.61
PM10	1.29	2.48	0.00	2.27	0.00	2.09	0.00	0.00	6.48	14.61
SO2	0.10	0.11	0.00	0.10	0.00	0.22	0.00	0.00	6.04	6.57
NOx	4.25	14.26	0.00	13.10	0.00	29.58	0.00	0.00	91.38	152.57
VOC	2.89	1.24	0.00	1.14	0.00	2.57	0.00	0.00	7.28	15.12
CO	6.29	2.48	9.55	2.27	8,592.78	5.14	19,893.96	32.21	19.70	28,564.38
total HAPs	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
worst case single HAP	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30

Total emissions based on rated capacity at 8,760 hours/year.

Controlled Potential Emissions (tons/year)										
Emissions Generating Activity										
Pollutant	Boiler No. 3	Reformer No. 1 (taken from CP-089-8510-00435)	Process Vent Stack No. 1 (taken from CP-089-8510-00435)	Reformer No. 2 (taken from CP-089-8510-00435)	Process Vent Stack No. 2	Reformer No. 3	Process Vent Stack No. 3	Vent Stack from CO2 Plant	Two (2) Emergency Generators	TOTAL
PM	0.91	2.48	0.00	2.27	0.00	2.09	0.00	0.00	0.08	7.83
PM10	0.91	2.48	0.00	2.27	0.00	2.09	0.00	0.00	0.08	7.83
SO2	0.07	0.11	0.00	0.10	0.00	0.22	0.00	0.00	0.07	0.57
NOx *	2.97	14.26	0.00	13.10	0.00	4.44	0.00	0.00	1.04	35.81
VOC	2.02	1.24	0.00	1.14	0.00	2.57	0.00	0.00	0.08	7.05
CO	4.40	2.48	17.94	2.27	34.21	5.14	66.61	32.21	0.22	165.48
total HAPs	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
worst case single HAP	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20

Total emissions based on rated capacity at 8,760 hours/year, except for Emergency Generator (based on 100 hours/year).

* Praxair proposes to accept enforceable limits on fuel consumption so that the facility can avoid requirements of 326 IAC 2-3 (Emission Offset).

Praxair will limit NOx emissions to 32 tons per year (permit limit given in CP-089-8510-00435, issued in October 8, 1997).

Limited NOx emissions are based on limiting annual fuel consumption from Reformer #1, Reformer #2, Reformer #3, and Boiler #3 to 1,972 pounds per year.

NOx emissions are based on emission factors for Reformers #1, #2, #3 and Boiler #3 of 32.4, 32.4, 5.45 and 25 pounds NOx per million standard cubic feet (MMCF) of fuel consumed, respectively, which were established by the following equations:

Annual NOx from Reformers #1 and 2 = fuel consumption (MMBtu/yr) x heat content of the total Reformer fuel (tail gas + natural gas) x 0.0806 lbs/MMBtu

where: heat content of the total Reformers for #1 and 2 = 402 Btu/scf

Annual NOx from Reformer #3 = fuel consumption (MMBtu/yr) x heat content of the total Reformer fuel (tail gas + natural gas) x 0.0806 lbs/MMBtu x 0.15 NOx catalyst

where: heat content of the total Reformer for #3 = 451 Btu/scf

Annual NOx from Boiler #3 = fuel consumption (MMBtu/yr) x 0.025 lbs/MMBtu

Source may maintain the same NOx limit by burning more natural gas in Boiler #3 while burning less fuel in Reformer #1, Reformer #2, and Reformer #3.

NOx emission limit for Reformer #1, Reformer #2, Reformer #3, and Boiler #3 is expressed as follows:

32.4 AA + 5.45 BB + 25 NN cannot exceed 63,900 pounds per year

AA + 0.168 BB + 0.772 NN cannot exceed 1,972 pounds per year

where:

AA = Reformers #1 and #2 annual fuel consumption in MMCF/yr

BB = Reformer #3 annual fuel consumption in MMCF/yr

NN = Boiler #3 annual fuel consumption in MMCF/yr

Appendix A: Emissions Calculations**Natural Gas Combustion Only****MM BTU/HR <100****Boiler #3**

Company Name: Praxair, Inc.
Address City IN Zip: Foot of Standard Avenue, Whiting, IN 46394
CP: 089-10413
Plt ID: 089-00435
Reviewer: Yvette de los Angeles/EVP
Date: 06/21/99

Potential to Emit (Based on 8760 hours without control)

Heat Input Capacity MMBtu/hr	Potential Throughput MMCF/yr					
38.8	339.9					
Pollutant						
Emission Factor in lb/MMCF	PM 7.6	PM10 7.6	SO2 0.6	NOx* 25.0	VOC* 17.0	CO* 37.0
Potential Emission in tons/yr	1.292	1.292	0.102	4.249	2.889	6.288

Limited Potential to Emit (Based on Annual Fuel Limitation)

Heat Input Capacity MMBtu/hr	Annual Fuel Limitation	Potential Throughput MMCF/yr				
27.2	70.00%	237.9				
Pollutant						
Emission Factor in lb/MMCF	PM 7.6	PM10 7.6	SO2 0.6	NOx* 25.0	VOC* 17.0	CO* 37.0
Potential Emission in tons/yr	0.904	0.904	0.071	2.974	2.022	4.402

Methodology

All emission factors are based on normal firing.

MMBtu = 1,000,000 Btu

MMCF = 1,000,000 Cubic Feet of Gas

* Emission Factor for NO_x are based on stack test conducted on December 1998. Emission Factors for VOC and CO are provided by source.

These factors shall be stack tested after issuance of permit.

PM emission factors are condensable and filterable.

Potential Throughput (MMCF) = Heat Input Capacity (MMBtu/hr) x 8,760 hrs/yr x 1 MMCF/1,000 MMBtu

Emission Factors are from AP 42, Chapter 1.4, Tables 1.4-1, 1.4-2, 1.4-3, SCC #1-02-006-02, 1-01-006-02, 1-03-006-02, and 1-03-006-03

(SUPPLEMENT D 3/98)

Emission (tons/yr) = Throughput (MMCF/yr) x Emission Factor (lb/MMCF)/2,000 lb/ton

See page 2 for HAPs emissions calculations.

Appendix A: Emissions Calculations**Natural Gas Combustion Only****MM BTU/HR <100****Boiler #3****HAPs Emissions**

Company Name: Praxair, Inc.
Address City IN Zip: Foot of Standard Avenue, Whiting, IN 46394
CP: 089-10413
Plt ID: 089-00435
Reviewer: Yvette de los Angeles/EVP
Date: 06/21/99

HAPs - Organics

Emission Factor in lb/MMcf	Benzene 2.1E-03	Dichlorobenzene 1.2E-03	Formaldehyde 7.5E-02	Hexane 1.8E+00	Toluene 3.4E-03
Potential Emission in tons/yr	0.0	0.0	0.0	0.3	0.0

HAPs - Metals

Emission Factor in lb/MMcf	Lead 5.0E-04	Cadmium 1.1E-03	Chromium 1.4E-03	Manganese 3.8E-04	Nickel 2.1E-03
Potential Emission in tons/yr	0.0	0.0	0.0	0.0	0.0

Methodology is the same as page 1.

The five highest organic and metal HAPs emission factors are provided above.
Additional HAPs emission factors are available in AP-42, Chapter 1.4.

Appendix A: Emission Calculations
Natural Gas and Tail Gas Combustion in Reformer No. 3

Company Name: Praxair, Inc.
Address City IN Zip: Foot of Standard Avenue, Whiting, IN 46394
CP: 089-10413
Plt ID: 089-00435
Reviewer: Yvette de los Angeles/EVP
Date: 06/21/99

Heat Input Capacity
MMBtu/hr

Potential Throughput
MMCF/yr

83.8

1826.1

Heat Input Capacity includes:
 One (1) reformer for Hydrogen Plant No. 3

UNCONTROLLED POTENTIAL EMISSIONS

	Pollutant					
Emission Factor in lb/MMBtu	PM 0.0057	PM10 0.0057	SO2 0.0006	NOx* 0.0806	VOC* 0.007	CO* 0.014
Uncontrolled Potential Emission in tons/yr	2.09	2.09	0.22	29.58	2.57	5.14

* Emission Factors for NOx, CO and VOC are based on vendor-provided data and shall be stack tested after permit issuance.

CONTROLLED POTENTIAL EMISSIONS

	Pollutant					
Emission Factor in lb/MMBtu	PM 0.0076	PM10 0.0076	SO2 0.0006	NOx* 0.0806	VOC* 0.007	CO* 0.014
** Controlled Potential Emission in tons/yr	2.09	2.09	0.22	4.44	2.57	5.14

* Emission Factors for NOx, CO and VOC are based on vendor-provided data and shall be stack tested after permit issuance.

** NOx emissions are controlled by a selective catalytic reduction (SCR) with a control efficiency provided by the manufacturer of 85%.

Methodology:

MMBtu = 1,000,000 Btu

MMCF = 1,000,000 Cubic Feet of Gas

Heat content of Reformer gas = 402 Btu/SCF

All PM is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factors may be used to estimate PM10, PM2.5, and PM1 emission Factors from AP 42, Chapter 1.4, Tables 1.4-1 and 1.4-2, SCC #1-01-006-02, #1-02-006-02, #1-03-006-02, #1-03-006-03
 Emission (tons/yr) = Heat Input Capacity (MMBtu/hr) * Emission Factor (lb/MMBtu) * (8760 hours/year) / 2,000 lb/ton

issions.

Appendix A: Emission Calculations Plant #2 Process Startup Vent Stack

Page 5 of 9 App A

Company Name: Praxair, Inc.
Address City IN Zip: Foot of Standard Avenue, Whiting, Indiana 46394
Operation Permit Number: 089-10413-00435
Reviewer: Yvette de los Angeles/EVP
Date: 06/21/99

Potential To Emit (tons/yr):

Process	Emission Rate (lbs/hr)	Uncontrolled Emissions (lbs/yr)	Uncontrolled Emissions (tons/yr)
CO2 Absorber	889.2	7,789,392.00	3,894.70
PSA Feed	972.2	8,516,472.00	4,258.24
PSA Tail Gas	968.0	8,479,680.00	4,239.84

Methodology

Potential Emissions (ton/yr) = Emission Rate (lbs/hr) * 8,760 hrs/yr * 1 ton/2,000 lbs

Limited Emissions (tons/yr):

Process	Emission Rate (lbs/hr)	Usage Limitation	Limited Emissions (lbs/yr)	Limited Emissions (tons/yr)
CO2 Absorber	889.2	0.21%	16,005.60	8.00
PSA Feed	972.2	0.41%	34,999.20	17.50
PSA Tail Gas	968.0	0.21%	17,424.00	8.71
		TOTAL	68,428.80	34.21

Methodology

(1) Limited Emissions (ton/yr) = Emission Rate (lbs/hr) * Usage Limitation * 8,760 hrs/yr * 1 ton/2,000 lbs

(2) Emission rate provided by the applicant and shall be subject to stack testing after permit issuance. During each plant startup, process gas containing CO is vented until the proper system equilibrium operating state is reached. The startup includes venting of CO from following locations: (a) CO2 absorber feed line (1 hour/startup);

(b) PSA feed line (2 hour/startup), and (c) PSA tail gas (1 hour/startup). Therefore, each startup will take a total of 4 hours, with a maximum of 18 startups in total per year.

(3) Usage limitation = Number of hours per startup of each process/8,760 hrs/yr.

Appendix A: Emission Calculations Plant #3 Process Startup Vent Stack

Page 6 of 9 App A

Company Name: Praxair, Inc.

Address City IN Zip: Foot of Standard Avenue, Whiting, Indiana 46394

Operation Permit Number: 089-10413-00435

Reviewer: Yvette de los Angeles/EVP

Date: 06/21/99

Potential To Emit (tons/yr):

Process	Emission Rate (lbs/hr)	Uncontrolled Emissions (lbs/yr)	Uncontrolled Emissions (tons/yr)
CO2 Absorber	1,516.0	13,280,160.00	6,640.08
PSA Feed	1,513.0	13,253,880.00	6,626.94
PSA Tail Gas	1,513.0	13,253,880.00	6,626.94

Methodology

Potential Emissions (ton/yr) = Emission Rate (lbs/hr) * 8,760 hrs/yr * 1 ton/2,000 lbs

Limited Emissions (tons/yr):

Process	Emission Rate (lbs/hr)	Usage Limitation	Limited Emissions (lbs/yr)	Limited Emissions (tons/yr)
CO2 Absorber	1,516.0	0.25%	33,352.00	16.68
PSA Feed	1,513.0	0.50%	66,572.00	33.29
PSA Tail Gas	1,513.0	0.25%	33,286.00	16.64
TOTAL			133,210.00	66.61

Methodology

(1) Limited Emissions (ton/yr) = Emission Rate (lbs/hr) * Usage Limitation * 8,760 hrs/yr * 1 ton/2,000 lbs

(2) Emission rate provided by the applicant and shall be subject to stack testing after permit issuance. During each plant startup, process gas containing CO is vented until the proper system equilibrium operating state is reached. The startup includes venting of CO from following locations: (a) CO2 absorber feed line (1 hour/startup);

(b) PSA feed line (2 hour/startup), and (c) PSA tail gas (1 hour/startup). Therefore, each startup will take a total of 4 hours, with a maximum of 22 startups in total per year.

(3) Usage limitation = Number of hours per startup of each process/8,760 hrs/yr.

Appendix A: Emission Calculations CO Vent Emissions from CO2 Plant

Company Name: Praxair, Inc.
Address City IN Zip: Foot of Standard Avenue, Whiting, Indiana 46394
Operation Permit Number: 089-10413-00435
Reviewer: Yvette de los Angeles/EVP
Date: 06/21/99

Potential To Emit (tons/yr):

Process	Emission Rate (lbs/hr)	Uncontrolled Emissions (lbs/yr)	Uncontrolled Emissions (tons/yr)
CO2 Waste Gas	7.21	63,159.60	31.58
CO2 Feed	7.50	65,700.00	32.85
Maximum expected emissions:	7.36	64,429.80	32.21

Methodology

- (1) Potential Emissions (ton/yr) = Emission Rate (lbs/hr) * 8,760 hrs/yr * 1 ton/2,000 lbs
- (2) Emission rate provided by the applicant and shall be subject to stack testing after permit issuance.
 - (a) The tail gas generated by the PSA units in each of the three hydrogen plans contains a significant percentage of CO2. The CO2 is extracted from the tail gas and piped to the on-site CO2 plant, which purifies and liquifies the CO2 for sale.
 - (b) The CO2 feedstock to the CO2 plant contains about 520 ppm CO. This is removed during the CO2 purification process and vented continuously to the atmosphere through the CO2 vent (S/V 009). If the CO2 liquifier is down, all of the CO2 feedstock is vented temporarily through the same vent (S/V 009). Either way, the amount of CO vented remains the same.

**Appendix A: Emission Calculations
Combustion Engines - Diesel Fuel
Emergency Generator**

Company Name: Praxair, Inc.
Address City IN Zip: Foot of Standard Avenue, Whiting, IN 46394
CP: 089-10413
Plt ID: 089-00435
Reviewer: Yvette de los Angeles/EVP
Date: 06/21/99

Potential emissions calculated based on output rating (hp) (Based on 8760 hours per year)

Heat Input Capacity
Horsepower (hp)

Potential Throughput
hp-hr/yr

154.0

1,349,040.0

Emission Factor in lb/hp-hr	Pollutant					
	PM 0.0022	PM10 0.0022	SO2 0.0021	NOx 0.0310	VOC 0.0025	CO 0.0067
Potential Emission in tons/yr	1.5	1.5	1.4	20.9	1.7	4.5

Methodology

Potential Throughput (hp-hr/yr) = hp * 8760 hr/yr

Emission Factors are from AP42 (Fifth edition, January 1995), Table 3.3-1

Emission (tons/yr) = [Heat input rate (MMBtu/hr) x Emission Factor (lb/MMBtu)] * 8760 hr/yr / (2,000 lb/ton)

Emission (tons/yr) = [Potential Throughput (hp-hr/yr) x Emission Factor (lb/hp-hr)] / (2,000 lb/ton)

Actual emissions calculated based on limited output rating (hp)

Heat Input Capacity
Horsepower (hp)

Usage
Limitation

Actual Throughput
hp-hr/yr

1.8

1.14%

15400.0

Emission Factor in lb/hp-hr	Pollutant					
	PM 0.0022	PM10 0.0022	SO2 0.0021	NOx 0.0310	VOC 0.0025	CO 0.0067
Actual Emission in tons/yr	0.0	0.0	0.0	0.2	0.0	0.1

Methodology

Actual Throughput (hp-hr/yr) = hp * 8760 hr/yr

Emission Factors are from AP42 (Fifth edition, January 1995), Table 3.3-1

Emission (tons/yr) = [Heat input rate (MMBtu/hr) x Emission Factor (lb/MMBtu)] * 8760 hr/yr / (2,000 lb/ton)

Emission (tons/yr) = [Actual Throughput (hp-hr/yr) x Emission Factor (lb/hp-hr)] / (2,000 lb/ton)

**Appendix A: Emission Calculations
Combustion Engines - Diesel Fuel
Emergency Generator**

Company Name: Praxair, Inc.
Address City IN Zip: Foot of Standard Avenue, Whiting, IN 46394
CP: 089-10413
Plt ID: 089-00435
Reviewer: Yvette de los Angeles/EVP
Date: 06/21/99

Potential emissions calculated based on output rating (hp) (Based on 8760 hours per year)

Heat Input Capacity Potential Throughput
Horsepower (hp) hp-hr/yr

519.0 4,546,440.0

Emission Factor in lb/hp-hr	Pollutant					
	PM 0.0022	PM10 0.0022	SO2 0.0021	NOx 0.0310	VOC 0.0025	CO 0.0067
Potential Emission in tons/yr	5.0	5.0	4.7	70.5	5.6	15.2

Methodology

Potential Throughput (hp-hr/yr) = hp * 8760 hr/yr

Emission Factors are from AP42 (Fifth edition, January 1995), Table 3.3-1

Emission (tons/yr) = [Heat input rate (MMBtu/hr) x Emission Factor (lb/MMBtu)] * 8760 hr/yr / (2,000 lb/ton)

Emission (tons/yr) = [Potential Throughput (hp-hr/yr) x Emission Factor (lb/hp-hr)] / (2,000 lb/ton)

Actual emissions calculated based on limited output rating (hp)

Heat Input Capacity Usage Actual Throughput
Horsepower (hp) Limitation hp-hr/yr

5.9 1.14% 51900.0

Emission Factor in lb/hp-hr	Pollutant					
	PM 0.0022	PM10 0.0022	SO2 0.0021	NOx 0.0310	VOC 0.0025	CO 0.0067
Actual Emission in tons/yr	0.1	0.1	0.1	0.8	0.1	0.2

Methodology

Actual Throughput (hp-hr/yr) = hp * 8760 hr/yr

Emission Factors are from AP42 (Fifth edition, January 1995), Table 3.3-1

Emission (tons/yr) = [Heat input rate (MMBtu/hr) x Emission Factor (lb/MMBtu)] * 8760 hr/yr / (2,000 lb/ton)

Emission (tons/yr) = [Actual Throughput (hp-hr/yr) x Emission Factor (lb/hp-hr)] / (2,000 lb/ton)